Background

EPA designated the original Silver Bow Creek Site as a Superfund site in September 1983. During the course of the initial investigations at the site, the importance of Butte as a source of contamination to Silver Bow Creek was formally recognized. Preliminary results indicated that upstream sources (i.e., ubiquitous mining-related wastes throughout Butte) were partly responsible for the contamination observed in the creek. EPA subsequently modified the existing Silver Bow Creek Site to include the Butte area and the formal name was changed to the "Silver Bow Creek/Butte Area NPL Site" in 1987. Operable Units (OUs) were formed and the BPSOU was one of four remedial OUs formed in the Butte Area: the others being the Mine Flooding, the Active Mining Area, and Non-Priority Soils. The BPSOU consists of the mining-related waste rock, tailings, mill wastes, and contaminated soils in populated areas of Butte and Walkerville. EPA recognized that these wastes and contaminated soils within the populated urban area of Butte presented potential human health risks and implemented many response actions to address these risks. Over 400 acres of land within the BPSOU were addressed through response actions prior to the Record of Decision (ROD) in 2006. Since the ROD, human health risks in the BPSOU have been mainly addressed through implementation of the Residential Metals Abatement Program operated by the Butte-Silver Bow County Health Department.

Also in 1987, the Butte Soils Screening Study was conducted to provide EPA with site characterization data for the purpose of prioritizing future investigation, response, and removal activities. Data from this study helped established areas of high priority (i.e., the BSPOU and Mine Flooding OU) and lower priority (i.e., the Non-Priority and Active Mining OUs). Based on the data obtained, the Butte Flats and non-urbanized outside of Butte proper were sequenced as a lower priority due to the low potential for human health exposure. The figure shows the soil data that has been collected outside of the BPSOU from various studies since the late 1980s.

With the focus being on issues mainly within the BPSOU through the 1990s and 2000s, resources were not allocated to what is now referred to as the West Side Soils OU (formerly Non-Priority Soils). As defined in the BPSOU ROD, the West Side Soils OU includes other metals-impacted areas within the Silver Bow Creek/Butte Area Site not addressed under the BPSOU, the BMFOU, or the Active Mining OU. The West Side Soils OU abuts the BPSOU and Active Mining OU to the east and the Streamside Tailings OU and Rocker OU to the south. The West Side Soils OU was separated from the BPSOU due mainly to the presence of urbanized areas within or near former mining activities. Separation of the Butte Flats from the BPSOU utilized different criteria: the Flats were not associated with significant mining activity and had comparatively low soil-lead results compared to residential and source areas within the BPSOU. The southeast boundary of the BPSOU was originally established by the area within the 100-year floodplain that was designated as the Area 1 OU which includes portions of the Week Concentrator complex, the Metro Storm Drain (now Upper Silver Bow Creek) from below the Weed Concentrator to its mouth, and the reach of Silver Bow Creek from below the confluence of Blacktail Creek and Upper Silver Bow Creek to below the former Colorado Tailings.

Using the lead action levels developed for the BPSOU, soil results west of the BPSOU exceeding 2,300 mg/kg lead are present in multiple waste piles, but these piles are away from populated areas. Data from BSB taken at several residences adjacent to the BPSOU (to the west and north) were below the BPSOU action level for lead (1,200 mg/kg). Lead data from the Butte Flats (i.e., area that is located generally southeast of the BPSOU boundary), with the exception of one historic sample of apparent fill

material at the now-demolished Longfellow School, were also below the residential action level for lead. Elevated arsenic results in soil usually have a correspondingly high lead result, so there are few exceedances of the arsenic action levels (i.e., 250, 500, and 1,000 mg/kg arsenic for residential, commercial, and recreational, respectively) without a corresponding lead exceedance. One known exception is a residence sampled in 2017 by BSB in the Hillcrest Drive area which had subsurface sample results that exceeded the residential arsenic soil action level of 250 mg/kg. It was noted by BSB that these subsurface samples appeared to be of possible imported slag fill material. Another exception is a residence, just northwest of the BPSOU boundary, that looks to be built on imported fill which also had elevated arsenic.

What Existing Sampling Shows

EPA typically prioritizes work at Superfund sites address areas of highest risk first. This is true of Butte. Decisions on priority were based on initial screening and have been validated through subsequent sampling events.

To illustrate the risk outside of the BPSOU, EPA has mapped the locations and lead concentrations of samples collected to date in the rest of Butte. Lead is the primary contaminant of concern for human health in Butte. Samples whose concentrations are below the 1,200 parts per million lead clean up level are shown as green. Those above are shown as orange or red (see legend).

The map illustrates:

1. Outside the BPSOU, there are *very* few lead concentrations above the cleanup level.
    - One sample located southeast of the BPSOU boundary was above the residential action level for lead. This location was the former Longfellow School. It has been redeveloped since that sample was collected.
2. Elevated concentrations in the Westside Soils OU are found primarily in waste piles. They are not an unacceptable risk to human health.
    - The area west of the BPSOU (west of Montana Tech campus) has sample results above the recreational action level. This area has visible piles of mine waste. However, there are no residences in this area. In addition, the majority of the waste piles are on private property. As such, there should be limited human exposure to the materials in the areas of the high sample results for lead.

Elevated concentrations in Rocker have been addressed since sampling as part of the actions taken at that OU.

Work at the Westside Soils OU is slated to continue in 2018 and will entail additional sampling. As with any other OU, current and future risk will be quantified and addressed as work proceeds.

BPSOU Boundary

- Why does the BPSOU extend south of the interstate? The original BPSOU southeastern border captured the 100-year floodplain (Area 1 OU), including parts of the Weed Concentrator Complex, Metro Storm Drain (Upper Silver Bow Creek) from below the concentrator to its mouth, and the reach of Silver Bow Creek from below the confluence of Blacktail Creek and Upper Silver Bow Creek to below the former Colorado Tailings. It was extended south across the interstate, through an uncontaminated area, to capture the Timber Butte Mill.
- Why was Westside Soils separated from BPSOU? The Westside Soils OU had no urbanized areas within or near former mining activities. Human health risk was, and remains, low.
- Why was the Butte Flats separated from the BPSOU? The Butte Flats are not associated with significant mining activity and have comparatively low soil-lead results compared to the BPSOU.

Data Description

Sample Locations

The database contains 523 locations. 185 of those location were identified by map interpolation where figures or descriptions in reports were used to identify the location. These locations are approximate and may be of poor quality. The remaining 337 locations in the database were located using a GPS or survey.

219 of the locations are within a half a mile of the BSPOU boundary and 395 locations are within a mile of the boundary.

Samples

There are 645 unique soil samples in the database. 290 of the samples were taken prior to the year 2000. 417 of the samples have depth information available.

Lab Results

There are a total of 3965 results in the database. They provide information on eight different metals. Below if a breakdown of the results by analyte.

- Aluminum – 242 results
- Arsenic – 650 results
- Cadmium – 517 results
- Copper – 528 results
- Iron – 318 results
- Lead – 650 results
- Mercury – 292 results
- Silver – 240 results
- Zinc – 528 results

Database

The database of samples outside of the BPSOU was developed using a Scribe database. The event sampling portions of the database were adapted to hold information about the historic documents that were used as sources for the analytical data available outside of BPSOU. The existing Scribe location, samples and lab result tables were not changed

Data Sources

Data in the database comes from 16 different sources. The earliest source comes from 1987 and the most recent data is from 2017. Below is a breakdown of the results by each data source. Note that data may have been taken in a different year than when the report was issued.

Data Source ID	Year	Data Source	# of Locations	# of Results
1	1988	Butte Soil Screening Study	148	1995
2	1987	Butte Centerville Soil Sampling	17	114
3	2006	NW and S of MT Tech	24	288
4	2009	W and S of MT Tech	3	36
5	1987	Orphan Boy Waste Dump	1[1]	30
6	2014	Westside Soils DSR	101	390
7	2017	Multi-Pathway Residential Metals	76	152
8	2017	Trilling Project	11	55
9	2004	ARCO West Butte Land Offer	51	190
10	2017	ARCO Waste Rock Dump Sample	57	311
11	1998	CDM DSR for Stream Sediment and Soil Sampling in Grove Gulch, Blacktail Creek, and the SBC Diversion Channel	4	20
12	2017	Hillcrest Drive	3	18
13	1994	AGI Railbed Assessment	11	30
14	1991	CDM Railroad Grade Sampling	8	56
15	1990	Area 1 OU Phase II RI DSR	7	148
16	1995	CDM BPSOU 1994 Soil Sampling	1	5

[1] Samples were taken in five locations but only one generalized location is in the database and depicted on the maps due to missing coordinates.

Data Quality

Some of the identified data sources contained XRF data or other data that was more suited as screening data. Data can be flagged in the database as screening so that it can be easily filter for appropriate use. Data Sources 5, 6, 7, 8, 9, 10, 12, 13, and portions of 15 were flagged for containing data that is of screening quality. The table below shows each data source, what the database code for the data quality is, what the CFR Data Quality Indicator equivalent is, as well as a reason for the database code. Together, the data that is classified as SCREEN accounts for 1291 of the results. Other data may be flagged as data sources receive additional review.

Data Source	Database Code	CFR Data Quality Indicator	Reason
1-Butte Soils Screening Study_1988	QUANT	E	
2-Butte Centerville Soil Sampling_1997	QUANT	E	
3-NW and S of MT Tech_2006	QUANT	E	
4-W and S of MT Tech_2009	QUANT	E	
5-Orphan Boy Waste_1987	SCREEN	S	Lack of sampling documentation and non-standard analytical method
6-Westside Soils DSR_2014	SCREEN	S	XRF
7-Mutli-Pathway Residential Metals_2017	SCREEN	S	XRF
8-Trilling Project_2017	SCREEN	S	XRF
9-ARCO 2004 West Butte Land Offer	SCREEN	S	Lack of sampling documentation
10-AR Waste Rock Dump Samples 2017	SCREEN	S	Lack of sampling documentation
11-CDM Grove Gulch BTC and SBC DSR_1997	QUANT	E	
12-Hillcrest Drive_2017	SCREEN	S	Non-standard analytical method
13-AGI Railbed Assessment_1994	SCREEN	S	Non-standard analytical method
14-CDM Railroad Grade Sampling_1991	QUANT	E	
15-Area 1 OU Phase II RI DSR_1990	QUANT and SCREEN	E and S	XRF used as a screening tool for laboratory analysis
16-CDM BPSOU 1994 Soil Sampling_1995	QUANT	E	

References for Data Sources

- 1 - Butte Soils Screening Study_1988:
  - Butte Soils Screening Study, Final Report. Prepared for EPA by Camp, Dresser, & McKee, Inc. April 19, 1988. EPA Record Center #: 4412405.

- 2 - Butte Centerville Soil Sampling_1987:
  - Butte/Centerville Soil Sampling Project Report. Prepared by Tetra Tech, Inc., for Anaconda Minerals Company. April 1987. EPA Record Center #: 4030611.

- 3 - NW and S of MT Tech_2006:
  - Soil Sampling Results from Areas Northwest and South of the North Campus of Montana Tech of The University of Montana Butte, Montana, by Montana Bureau of Mines and Geology. February 2006. Provided by Ted Duaime (MBMG) via email October 2, 2017.

- 4 - W and S of MT Tech_2009:
  - Soil Sampling Results from Areas West and South of the North Campus of Montana Tech of The University of Montana Butte, Montana, by Montana Bureau of Mines and Geology. March 2009. Provided by Ted Duaime (MBMG) via email October 2, 2017.

- 5 - Orphan Boy Waste_1987:
  - Memos providing analytical results of Orphan Boy Mine waste. October 19 and December 4, 1987. Provided by Ted Duaime (MBMG) via email October 2, 2017.

- 6 - Westside Soils DSR_2014:
  - Draft Final Westside Soils Data Summary Report/Land Improvements Report. Prepared by Columbia Basin, LLC, for EPA. August 2014.

- 7 - Multi-Pathway Res Metals_2017
  - Butte Priority Soils Operable Unit (BPSOU) Revised Multi-Pathway Residential Metals Abatement Program Plan. Prepared by Butte Silver Bow County and Atlantic Richfield Company. January 2017.

- 8 - Trilling Project_2017
  - Jared Trilling Project. Provided to EPA by Dr. Robert Pal (Montana Tech) on October 30, 2017.

- 9 - ARCO 2004 West Butte Land Offer:
  - ARCO 2004 West Butte Land Offer. Sampling conducted by Tom Malloy (BSB). November 2004,

- 10 - AR Waste Rock Dump Samples 2017:

- Atlantic Richfield Company Waste Rock Dump Sampling. August 2017.

- 11 - CDM Grove Gulch BTC and SBC DSR_1997:
  - Data Summary Report for Stream Sediment and Soil Sampling in Grove Gulch, Blacktail Creek, and the Silver Bow Creek Diversion Channel, CDM Federal Programs Corporation, October 1998. EPA Records Center #: 4030820.

- 12 - Hillcrest Drive_2017:
  - Sampling on Hillcrest Drive by BSB County. Data provided by Brandon Warner (BSB) November 16, 2017.

- 13 - AGI Railbed Assessment_1994:
  - Railbed Assessment, Butte Priority Soils Operable Unit, Butte, Montana, dated January 17, 1994, and October 1994 Supplemental Soil Sampling dated March 30, 1995. Prepared by Applied Geotechnology, Inc.

- 14 - CDM Railroad Grade Sampling_1991:
  - Updated Priority Soils Railroad Data. Prepared by CDM Federal for EPA. June 19, 1991.

- 15 - Area 1 OU Phase II RI DSR_1990:
  - Draft Final Silver Bow Creek CERCLA Phase II Remedial Investigation Data Summary Area 1 Operable Unit. Prepared by CH2M Hill and Chen-Northern dated August 29, 1990.

- 16 - CDM BPSOU 1994 Soil Sampling_1995:
  - Butte Priority Soils Operable Unit (BPSOU) November 1994 Soil Sampling Results. Prepared by CDM Federal for EPA. January 26, 1995.

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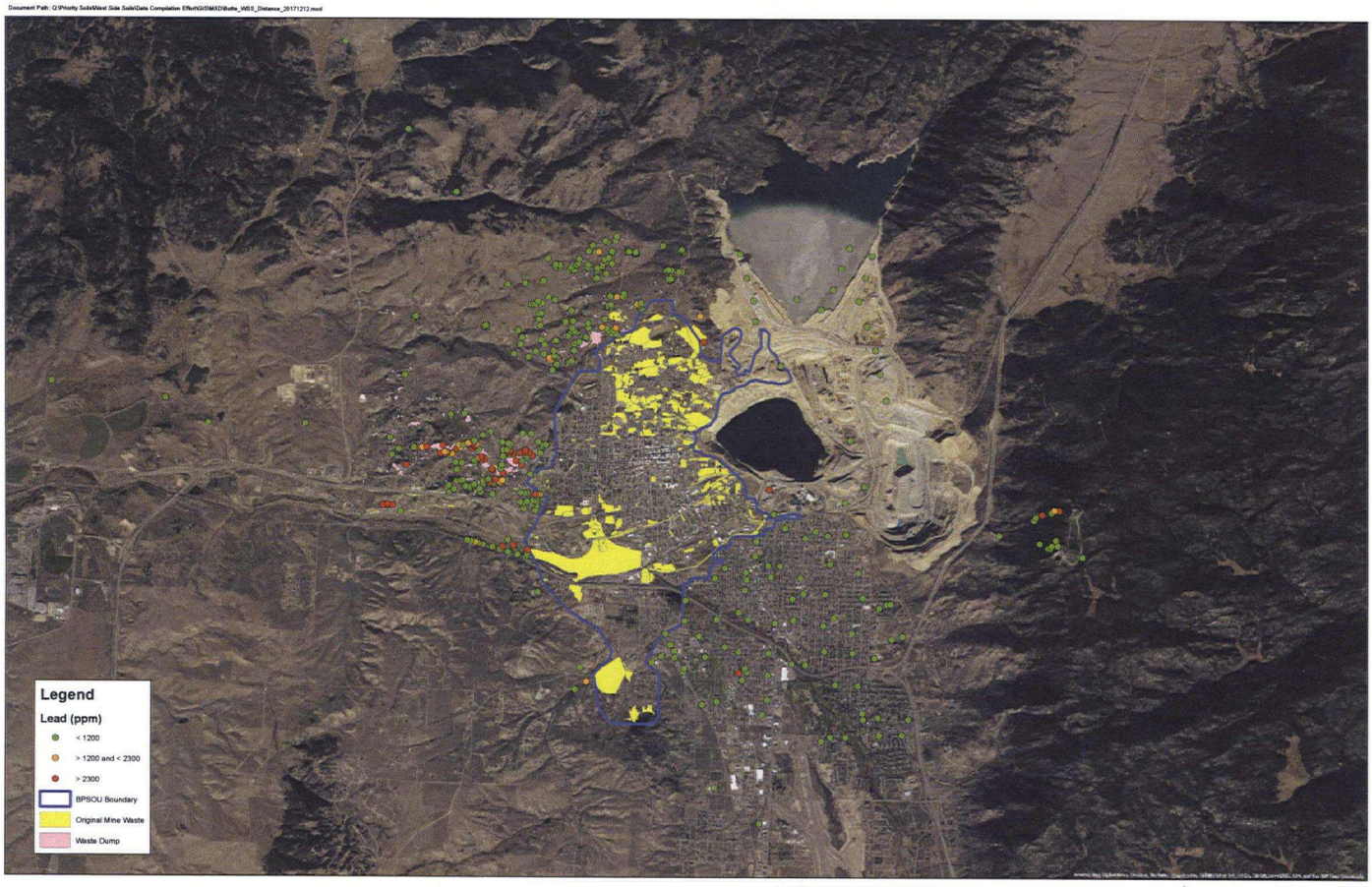

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